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THE EFFECT OF SONIC BOOM ON THE NESTING AND BROOD REARING BEHAVIOR OF THE EASTERN WILD TURKEY

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16. Abstract
Twenty wild turkey hens were captured and equipped with 164 MHz transmitters. The nest sites of eight hens were successfully located by telemetric triangulation and four of these were subjected to both real and simulated sonic booms. Hens with young were also located but were subjected to simulated sonic booms only. Sonic booms did not initiate any abnormal behavior in wild turkeys that would result in decreased productivity.

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THE EFFECT OF SONIC BOOM ON THE NESTING AND BROOD REARING BEHAVIOR OF THE EASTERN WILD TURKEY[1]

Thomas E. Lynch[2] and Dan W. Speake[3]

ABSTRACT

Twenty wild turkey hens were captured and equipped with 164 MHz transmitters. The nest sites of eight hens were successfully located by telemetric triangulation and four of these were subjected to both real and simulated sonic booms. Hens with young were also located but were subjected to simulated sonic booms only. Sonic booms did not initiate any abnormal behavior in wild turkeys that would result in decreased productivity.

INTRODUCTION

The effect of sonic boom on native fauna has been discussed since the advent of supersonic flight. The possibility that sonic boom might cause abnormal behavior in birds that might result in abandonment of the nest or that sonic boom might cause the hen to desert her young or the young to scatter and become lost from the hen has also been considered.

The eastern wild turkey (<u>Meleagris gallopavo silvestris Vieillot</u>) was chosen as the subject of this study because of its importance as a game species and its shyness and tendency to desert its nest when dis-

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[1]A contribution of the Alabama Cooperative Wildlife Research Unit, Auburn University Agricultural Experiment Station, Game and Fish Division of the Alabama Department of Conservation and Natural Resources, the U. S. Fish and Wildlife Service and the Wildlife Management Institute, co-operating. The study was supported by a grant from the Federal Aviation Administration.

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[3]Leader, Alabama Cooperative Wildlife Research Unit.

turbed by man (Leopold 1944, Wheeler 1948, Williams et al. 1970). Welty (1962) described the hearing ability of birds by saying, "Although the cochlea of the average bird is approximately only one-tenth the length of the mammalian cochlea, it has about ten times as many hair cells per unit of length. This shorter, broader construction of the hearing mechanism of the avian ear suggest to Pumphrey (1961) that birds are less sensitive to a wide range of sound frequencies than mammals, but more sensitive to differences in intensitites. Further, a bird is able to hear and respond to rapid fluctuations in song about ten times as rapidly as man can. This fact is proved by the ability of young birds to imitate other birds' songs that have intricacies which are inaudible to human ears but visible in sound spectrographs."

The wild turkey not only has keen hearing but its vision is remarkable. The color perception and visual acuity of the wild turkey is equal to that of man but the rate of assimilation of detail, in the entire field of vision, is much higher than that of man. "Thus the vision of wild turkeys as a whole is no sharper but considerably faster than that of man" (Hewitt (ed.) 1967). Investigations of sound on wild turkey behavior had to be carried out in such a way that visual stimuli could be excluded.

The wild turkey is a ground nesting bird, laying an average of 12.3 eggs per clutch (Hewitt (ed.) 1967: 117). One egg is laid per day and the completed clutch is then incubated for 28 days. Only one clutch is hatched per year.

The nest site is usually in an area that offers concealment for the hen (Figure 1). This is important because the incubating hen remains on the nest all night and most of the day, leaving for a brief period daily to feed and water. Nesting normally begins in early April and 80% of the hatching is normally completed by the middle of June in central Alabama

Figure 1. Wild turkey nest site.

(Speake, et al. 1969).

After hatching, the hen usually leads her poults to an area adjacent to and including a pasture or a woods opening, where insects, grasses, and grass seed heads can be found as food for the young. The first 10 days are critical ones for the poults because they cannot yet fly to safety when attacked by a predator. When a hen senses danger, she issues a "putt" sound, which the poults react to by remaining completely motionless until the hen signals that the danger has passed.

Quite often, two or three hens with poults will join together to form what is known as a brood group. This banding together offers survival advantages to the young by increasing the possibility that a predator will be quickly detected. The brood group remains together until late fall when the young gobblers usually leave to form a separate flock.

The effect of sonic boom on the nesting behavior of wild turkey hens has not been investigated. Donohue et al. (1968) while observing from a camouflaged blind an incubating wild turkey hen reported no change in behavior immediately following a sonic boom. Further observations of nesting hens and also of brood groups at the time of sonic boom were justified in order to determine if abnormal behavior is induced which might result in losses of nests or of poults. Normal nesting behavior and brood group behavior of the wild turkey have been described in several recent studies (Williams et al. 1968; Speake et al. 1969; Hillestad and Speake 1970; Williams et al. 1970).

THE STUDY AREA

The study was conducted at Saco, Alabama in northeast Pike County and southwest Bullock County in east central Alabama and adjacent to the Conecuh River. This region lies in the upper coastal plain and soils are of the Troup, Luverne, and Lucedale groups. Topography varies from the flat to gently-rolling stream bottoms and pastures to the steep upland ridges. The mean annual temperature is 65.6^{o} and average annual precipitation is 46.05 inches. The entire area, except for public roads and scattered ¼ to ½ acre fenced game food plots, is open to grazing by cattle. Prescribed burning has not been employed in timber management or in game management. Wildfires have been very few in number and small in size. Principal habitat types are: mature pine, permanent pasture, bottomland hardwood, cutover pine, and old field.

The area is very sparsely populated and the principal industries are beef cattle and timber production. The hunting season for wild turkey is from March 15 to April 25 and only gobblers are legal game.

PROCEDURES

Twenty wild turkey hens were captured--fifteen by use of the oral anesthetic tribromoethanol (Williams et al. 1970), three by use of the oral anesthetic alpha-chloralose (Williams, 1966), and two by use of the rocket-projected net (Dill, 1969). In each of these trapping methods, turkeys were first lured to a chosen bait site by use of whole kernel corn. Cracked corn was then used as bait and the turkeys were allowed one to two weeks to become accustomed to feeding at the bait site and to become somewhat dependent on this site for food. At this time of year (late winter) choice, naturally occurring wild turkey foods are scarce. A well-camouflaged blind was constructed 25 to 40 yards from the bait site and the number of turkeys coming to the bait site was determined. When capturing with tribromoethanol, a dosage of 13 grams of drug per cup of cracked corn was used. One-half cup of drugged corn was allowed per turkey and the piles were spaced 3 feet apart. With alpha-chloralose, a dosage of 2 grams per cup of cracked corn was used. The use of a rocket-projected net involved the placement of bait in a 2 foot by 12 foot strip 2 feet in front of the middle of a 60 foot long by 30 foot wide net. The net was propelled by three rockets 24" in length and 2" in diameter and fueled with a solid propellant. The rockets were fired when the turkeys were feeding on the bait directly in front of the middle of the net with heads down.

Captured turkeys were transported in 12" x 18" x 30" paraffin-coated cardboard boxes, one per box, to the laboratory of the Alabama Cooperative Wildlife Research Unit in Auburn. Here each turkey was weighed and was aged by examining the terminal primary wing feather and the greater upper secondary covert patch as described by Williams (1961). Each turkey was then leg-banded with a numbered aluminum band and a 2½" x 6" brightly-colored vinyl wing marker was attached patagially to each turkey as described by Knowlton _et al_. (1964).

The turkeys were then equipped as described by Williams (1968) with 164 MHz transmitters weighing approximately 90 grams (Figure 2). This consisted of placing the transmitter "backpack fashion" on the back of the turkey and securing with 3/8 inch surgical tubing tied beneath the wings. Transmitters were manufactured by Sidney L. Markusen Electronic Specialties, Cloquet, Minnesota. Each turkey had a different transmission frequency. The turkeys were then returned to their holding boxes and when fully recovered were released at their capture sites, usually the following day.

Individual hens were located regularly by telemetric triangulation (Cochran and Lord, 1963). A 24-channel 164 MHz portable receiver manufac-

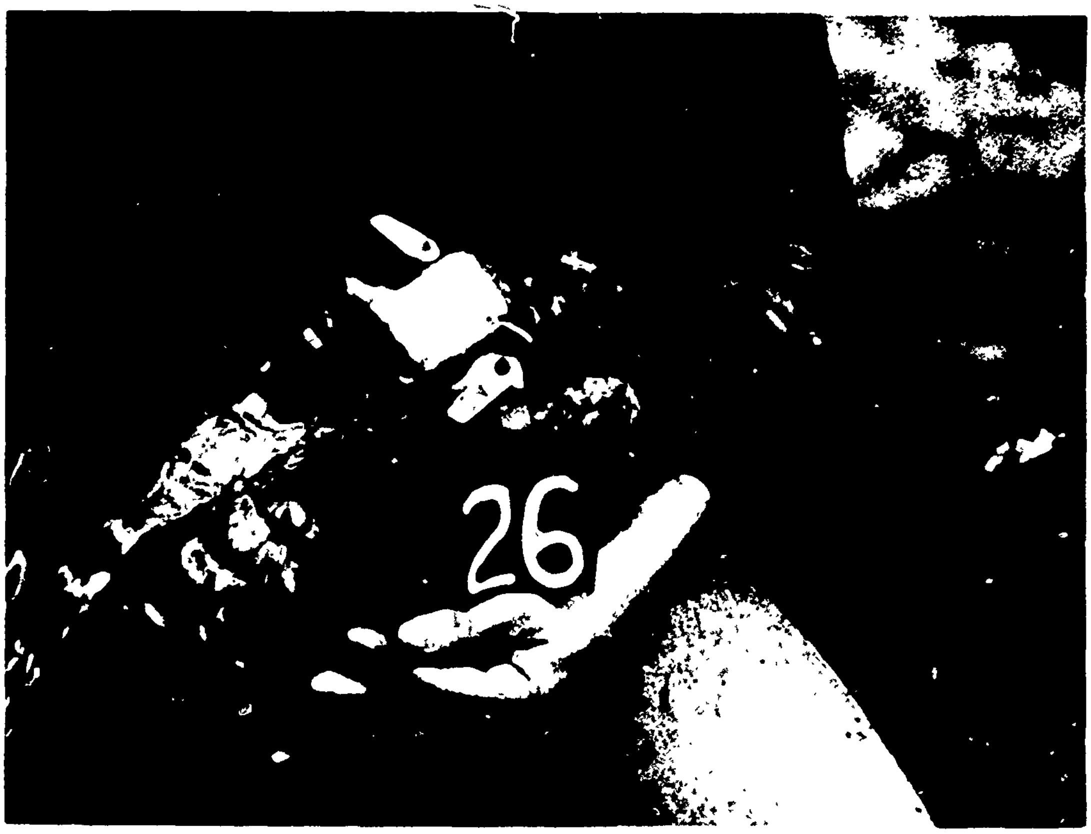


Figure 2. Wild turkey hen with transmitter and wing-marker.

tured by Sidney L. Markusen Electronic Specialties, Cloquet, Minnesota, with a hand-held yagi antenna was used. At least three compass bearings were taken on each hen from different known points on a map and the locations of the hens were plotted. After a hen was located at the same place for several consecutive days and assumed to be nesting, the investigator moved closer in order to locate the nest site. A permanent blind was then constructed after darkness at each nest site in order to observe the behavior of the hen during real or simulated sonic booms.

Supersonic overflights by military aircraft were flown in order that recordings could be made to compare intensities of real sonic booms to those of simulated sonic booms. Suitable dates were agreed upon with the FAA and arrangements were made for overflights on those dates.

In order to coordinate the measuring and recording effort with the time of occurence of each real sonic boom, a complicated procedure was necessary because only a 2½ minute supply of light-sensitive graph paper could be held by the oscillograph. At two minutes before the aircraft reached the area to be boomed, the pilot notified Atlanta Center by radio who then notified by telephone an assistant to the investigator. This assistant was stationed at a rural grocery store which was located within the area where the sonic boom would occur. The assistant then stepped outside the store and notified by walky-talky the investigator who then began the operation of the measuring and recording equipment.

A total of five real sonic booms--one on 20-May-1973 at 17:12 and four on 30-May-1973, one each at 08:23, 08:39, 16:07, and 16:29--were produced by military aircraft in cooperation with the FAA. The behavior of each individual nesting hen at the time of each real sonic boom was observed from camouflaged blinds and described in detail by personnel of the Alabama Cooperative Wildlife Research Unit.

In subjecting nesting hens to simulated sonic booms, the investigator would approach the blind slowly and enter cautiously so as not to alert the hen. After waiting quietly at least 30 minutes the investigator would then establish visual contact with the incubating hen on the nest. Binoculars were essential in locating and observing the hen because the coloration of her plumage blended so well with the surrounding vegetation. When the investigator was satisfied that the hen was not aware of his presence, he would signal by radio an assistant who would then launch a 2-inch shell from a point well out of sight of the hen. The distance from the 2-inch shell to the hen varied from 300 to 500 yards and provided an intensity comparable to that provided by real sonic booms.

While subjecting brood groups to simulated sonic booms, the investigator waited in a camouflaged blind in an area utilized by brood groups. When a brood group was sighted, he signaled an assistant by radio who then launched a 2-inch shell out of sight of the hen. The distance from the 2-inch shell to the hen, again, varied from 300 to 500 yards and provided an intensity comparable to that provided by real sonic booms.

MATERIALS AND METHODS

The measuring and recording equipment (Figures 3 and 4), supplied by NASA-Langley Research Center, consisted of two microphone systems. Each microphone was connected to one Dynagauge which was then connected to two Burr-Brown amps. This provided a total of four inputs which led to both an oscillograph and a tape deck (Figure 5). The oscillograph provided on light-sensitive graph paper an immediate evaluation of the intensity of the sonic boom. The tape deck provided a record of the signal from the Burr-Brown amps that could later provide an oscillograph printout of the sonic boom if needed.

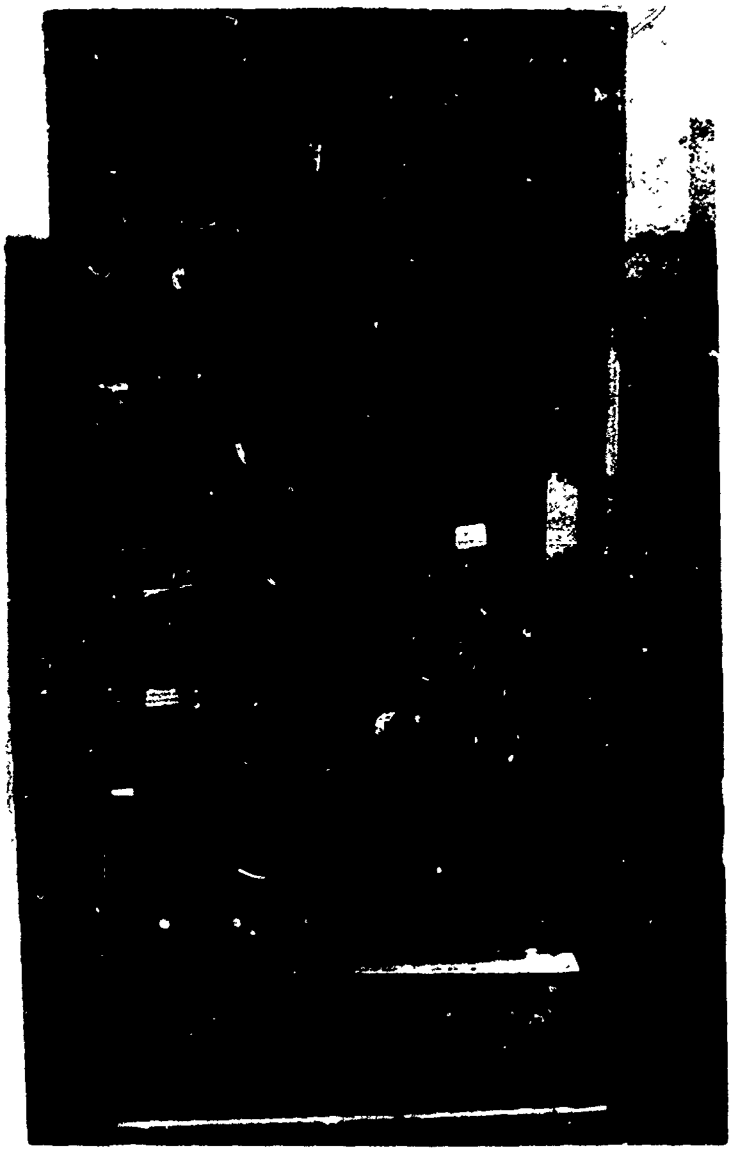


Figure 3. Control panel containing sonic boom measuring and recording equipment as installed in 12' mobile aluminum camper-trailer.

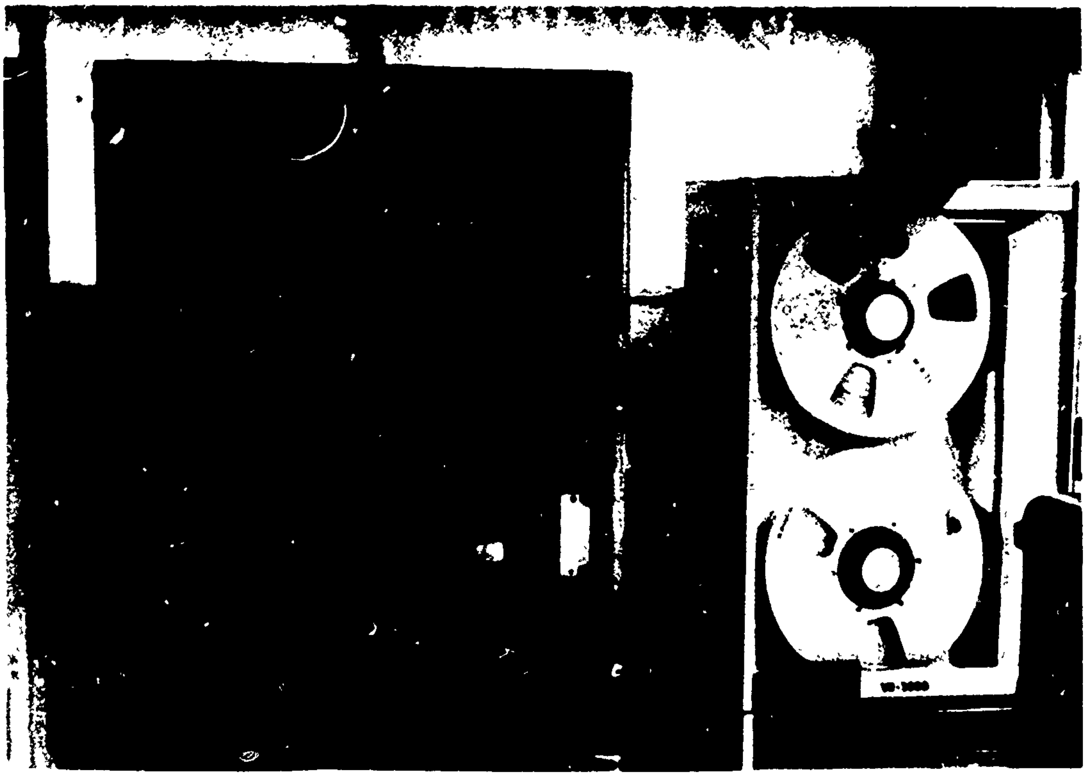


Figure 4. Control panel and data tape VR-3300 tape recorder as installed in 12' mobile aluminum camper-trailer.

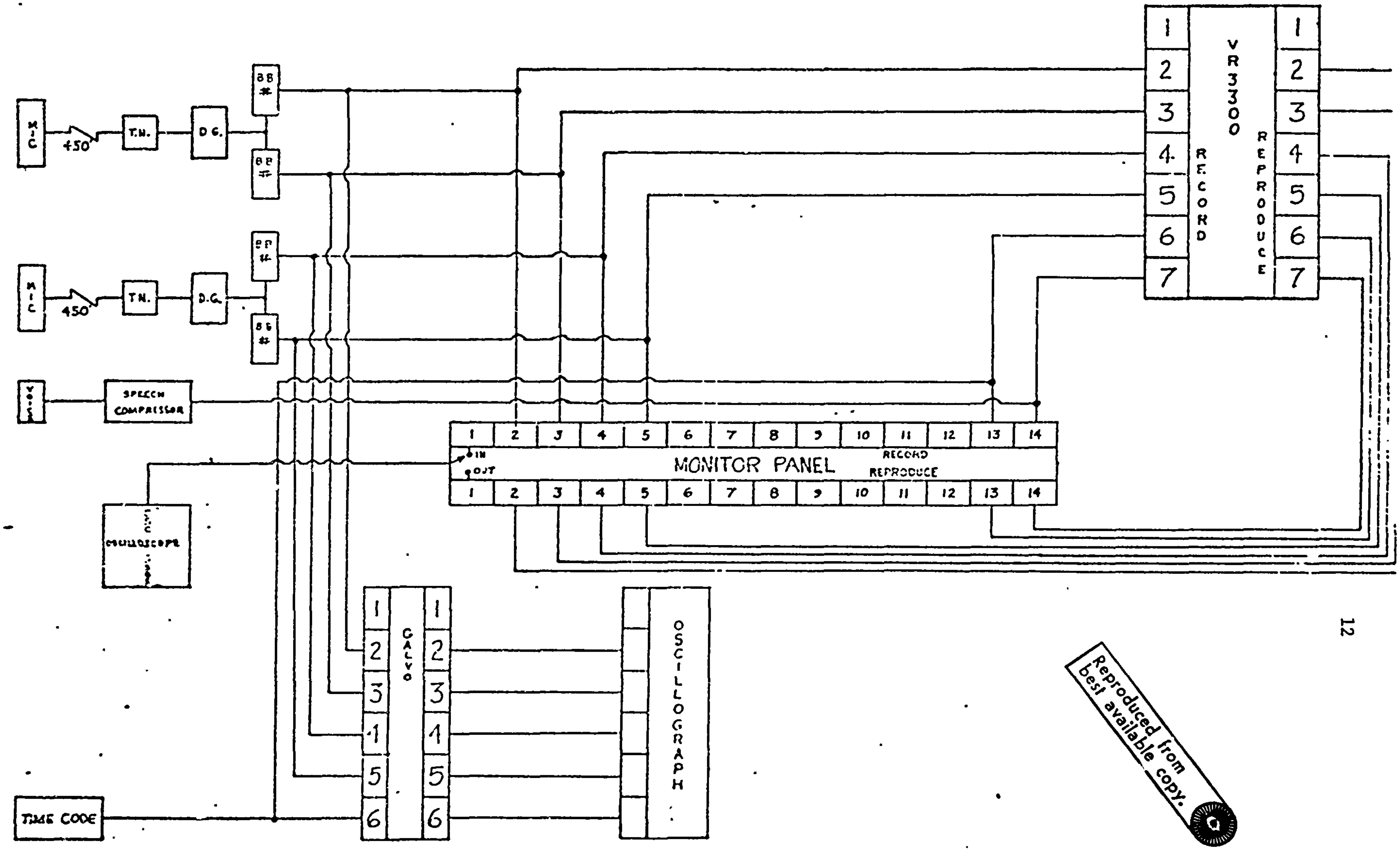


Figure 5. Diagram of measuring and recording equipment set-up.

The photocon microphone consisted of a capacitor and a coil that comprised a resonance tank circuit. The microphone is normally a 20 Hz to 10KHz instrument. The low end frequency response is achieved by restricting the air flow of the microphone vent such that 0.02 Hz to 10 KHz is achieved. The Dynagauge electronics provided the frequency required by the microphone (approx. 710 KHz) and a tuner to sense changes caused by the microphone. When the microphone diaphragm is exposed to a pressure, the capacitance changes; this causes the resonance frequency of the tank circuit to change. This is sensed by the tuner and a voltage corresponding to the microphone diaphragm motion is produced. The Burr-Brown amplifier provided a gain of 0 to 60 dB in steps of 2 dB. The flat frequency response is d.c. to 20 KHz or better. The galvanometer amplifiers provide up to 100 mA of current to drive the galvanometers in the direct write paper recorder. The tape recorder is frequency modulated operating at 30 ips. in the intermediate IRIG band with center frequency of 54 KHz that provides a frequency response of d. c. to 10 KHz.

The two microphones (Figure 6) were mounted side-by-side on a 4 foot x 4 foot sheet of ½ inch plywood (Figure 7) and covered by a wind sock (Figure 8). They were then connected by 1000 feet of coax cable to the Dynagauges (Figure 9). Electrical power for this equipment was produced by a portable gasoline-powered generator. The equipment was mounted in a 12 foot mobile aluminum camper-trailer in order that it might be easily transported in the field.

The real sonic booms were produced by military aircraft (Figures 10 and 11) cooperating with the FAA. Simulated sonic booms were produced by 2-inch mortar shells (Figure 12) provided by the FAA which were launched from an 18-inch length of 2¼" polyvinylchloride pipe (Figure 13).

Figure 6. Connecting photocon microphone to coax cable.

Figure 7. Close-up of photocon microphone installed in 4' x 4' sheet of ½" plywood.

Figure 8. Microphones installed side-by-side in 4' x 4' sheet of ½" plywood ready to be covered by wind sock.

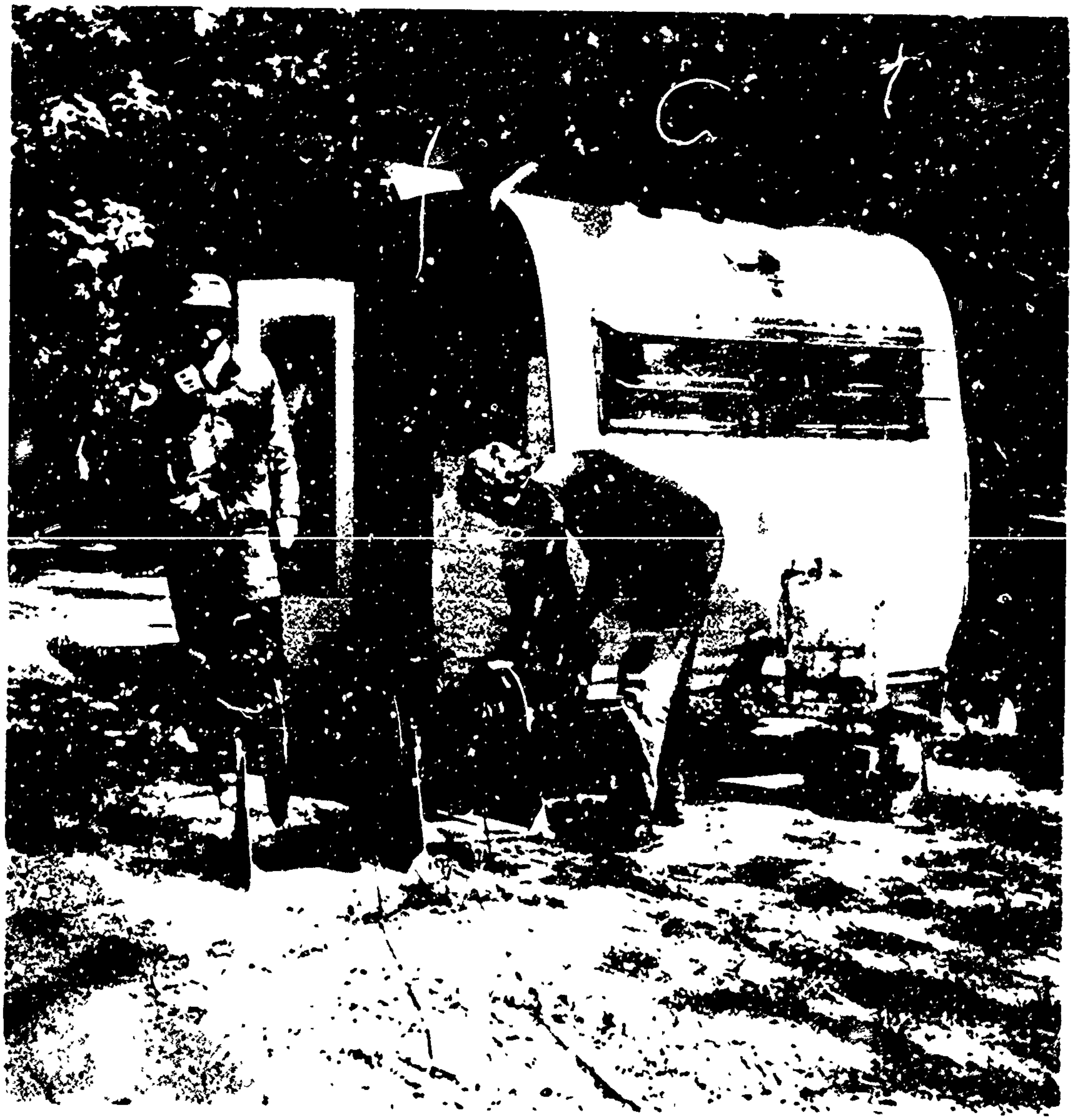


Figure 9. Two 1000' reels of coax cable connecting photocon microphones to measuring and recording equipment installed in the 12' mobile camper-trailer.

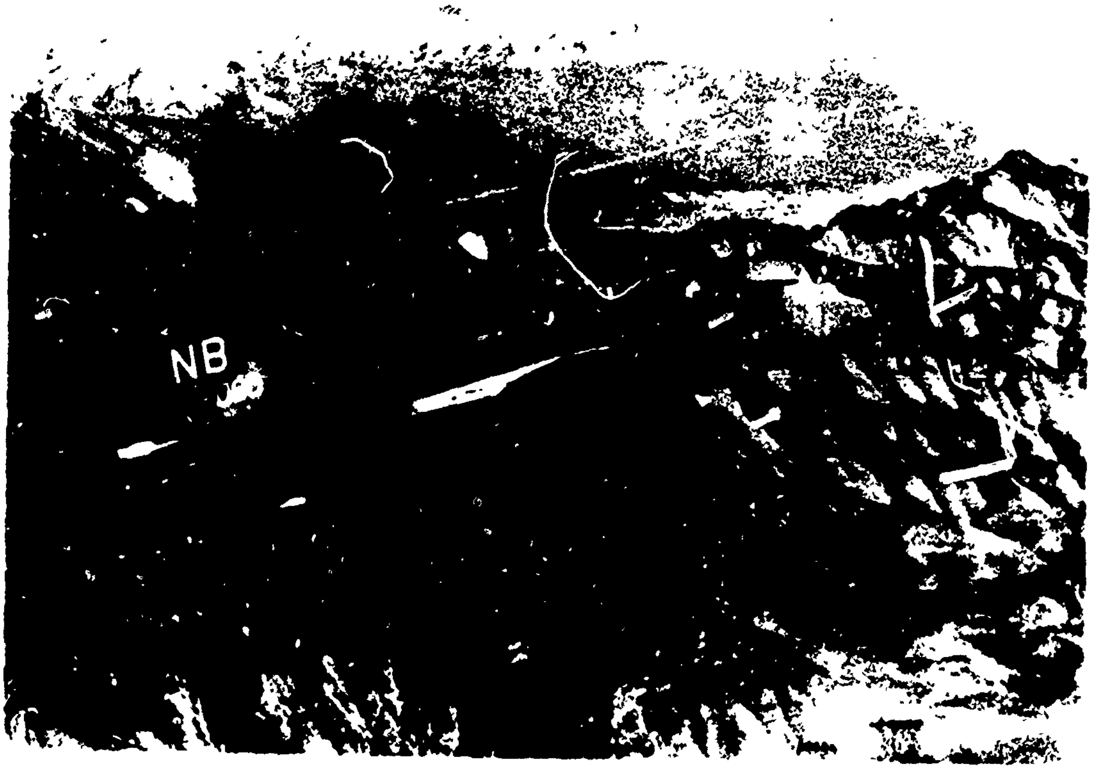


Figure 10. F-111 fighter used to generate sonic booms.

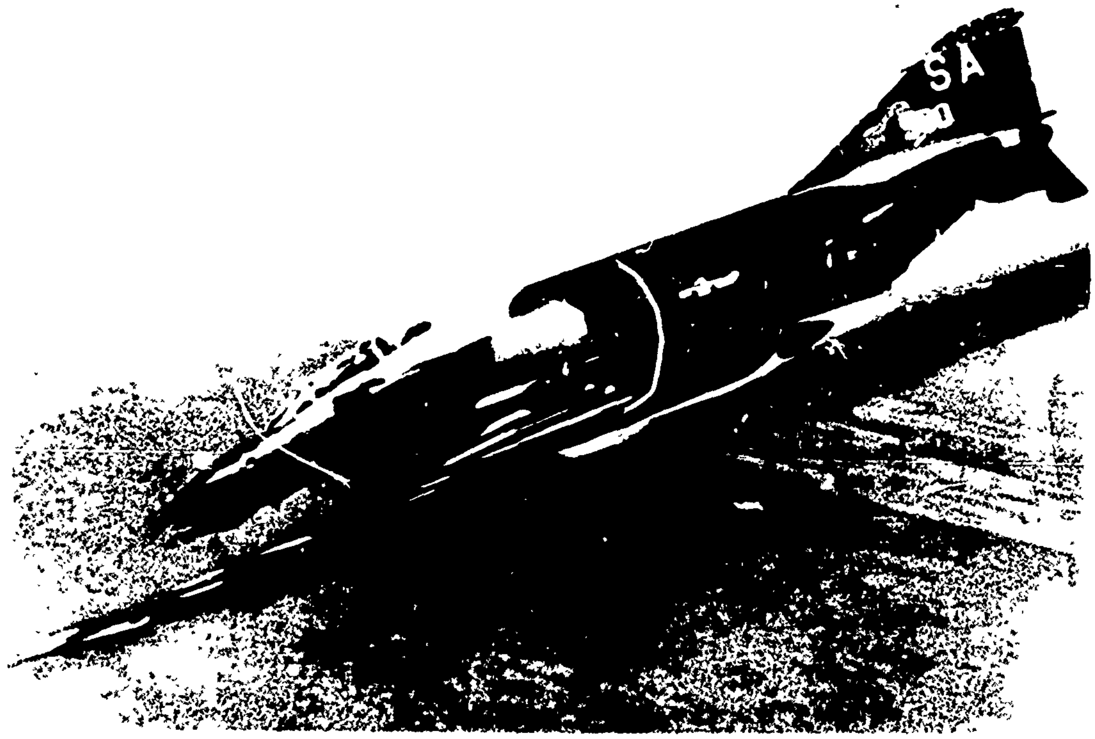


Figure 11. F-4 fighter used to generate sonic booms.

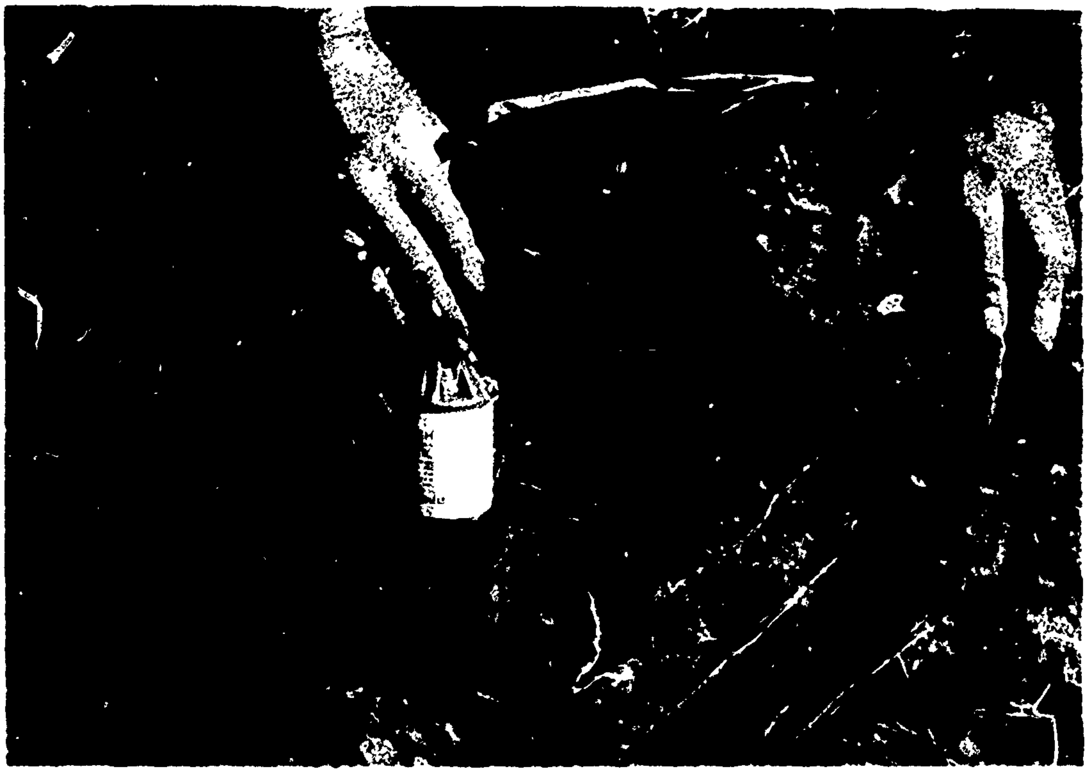


Figure 12. 2" mortar shell used to produce simulated sonic booms.

Figure 13. 2" shell loaded in mortar (18" length of 2¼" polyvinylchloride pipe) and ready to fire.

Observations of nesting hens and of brood groups would not have been possible without the aid of 10 x 50 binoculars and a 15 to 60X spotting scope.

TEST SET-UP

In order to obtain an accurate measurement of the intensity of the sonic booms that nesting wild turkey hens were being exposed to, the microphones and recording equipment were set up in an open, flat pasture. This pasture was bordered by forested, gradually rising hillsides (Figure 14).

Three overflights in a southerly direction and two in a northerly direction were flown by supersonic military aircraft along the flight path.

The locations of nest sites and also the locations of mortar launch sites are indicated in Figure 14. Mortar bursts occurred directly above the point of launching.

ANALYSIS AND DISCUSSION OF MEASURED SIGNATURES

The equipment described above was used to record both the real and the simulated sonic booms. These recordings were compiled and analyzed after the program to determine the level of each exposure and its characteristics.

A typical record for one of the airplane flyovers is shown in Figure 15. This is a time history of the pressure recorded by one of the microphones. The magnitude of each shock wave is indicated as is the time span between each. This particular record consists of two distinct pressure signatures following one another. This chain of sonic boom signatures is usually produced when the airplane is accelerated or maneuvered over the recording location. The signatures shown in this figure are characteristic of those produced during a level flight acceleration of the airplane (Kane 1973). This type of maneuver results in two observed signatures similar to those in the figure. The leading signature is generally in the shape of the

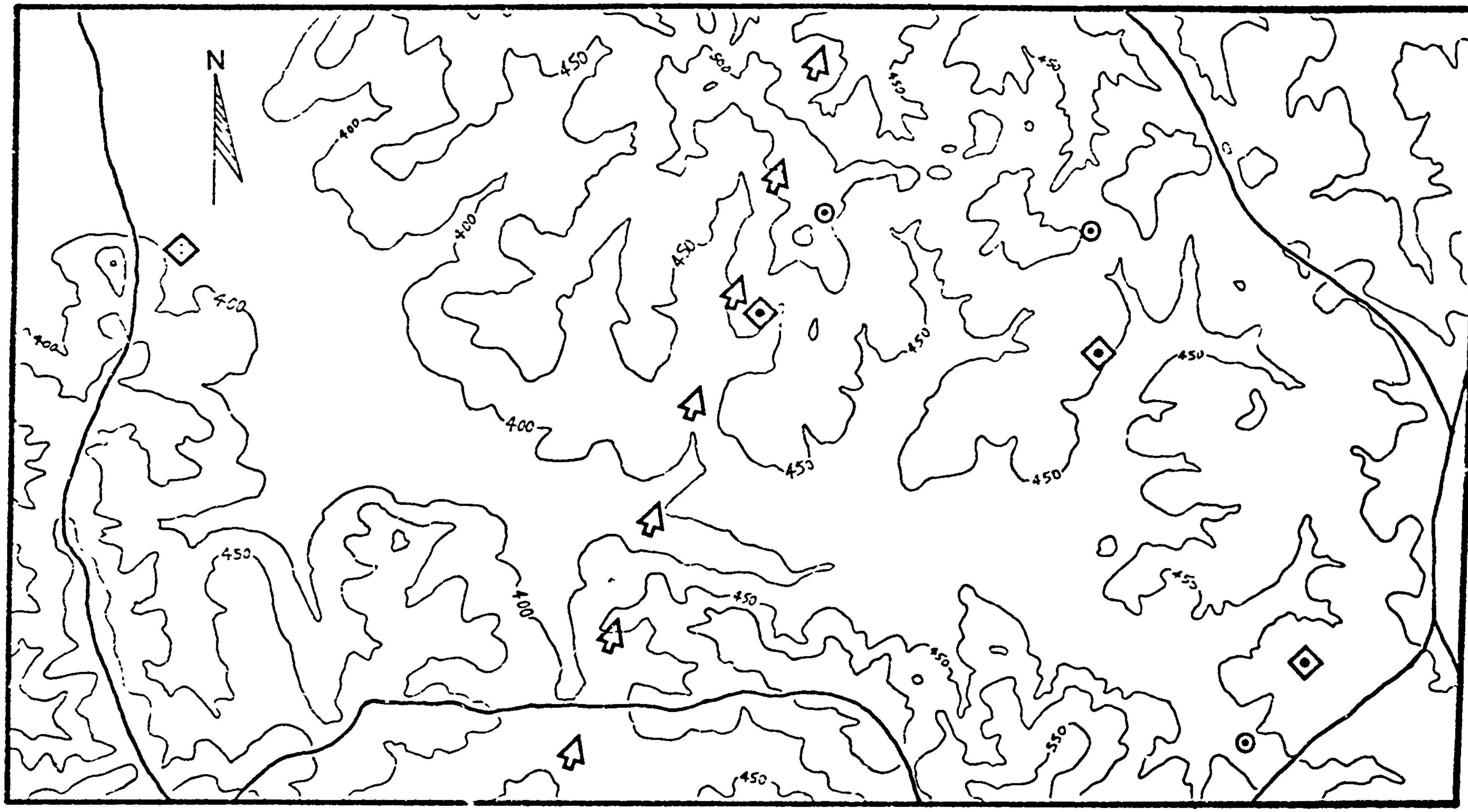


Figure 14. Map of sonic boom study area, Saco, Alabama.

nest locations
mic. locations
mortar locations
flight path
roads
contour interval .... 50 FEET
scale 0 1/4 1/2 3/4 1 miles

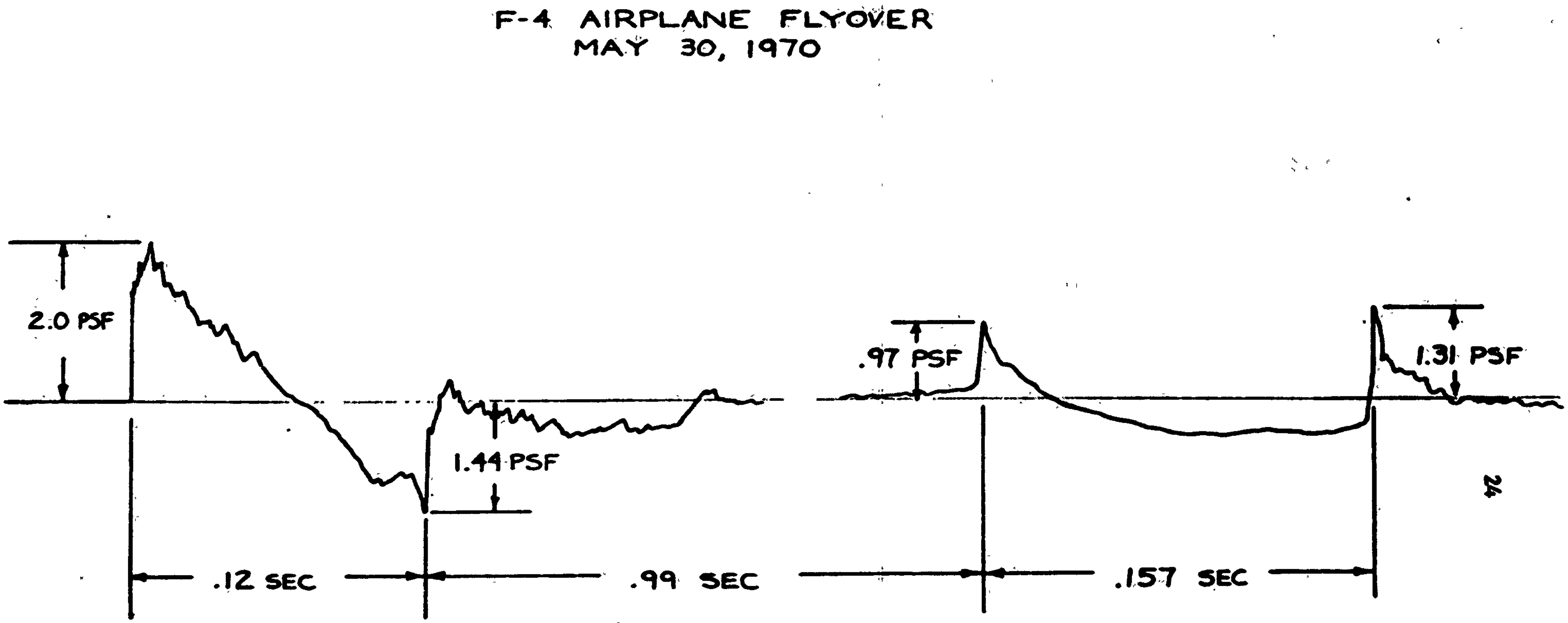
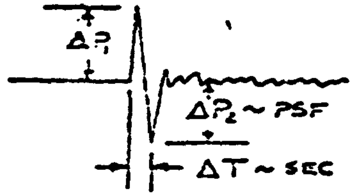


FIGURE 15. TYPICAL PRESSURE SIGNATURES RECORDED FROM AIRPLANE FLYOVER

letter "N" while the following signature usually takes on the shape of the letter "U". At some location prior to the position of this recording (further up the flight track toward the origin of the flyover) the two signatures will be merged producing a single signature with stronger shock waves.

Observations of the 2-inch shell burst sonic boom simulations are tabulated in Table 1 for the recordings made on August 31. A typical set of signatures is shown in Figure 16. Here also, the magnitude of the shock waves and the time between them has been noted. These shell bursts have a much smaller time delay between the shock waves than that for the airplane flyover. As a result, the ear perceives the stimuli as a single rather than a double boom. The magnitude of the shock waves shown in this figure is different for each microphone due to differences in the run levels set for each microphone and channel in the recording equipment.

The magnitude of the overpressures recorded from the airplane produced (real) sonic booms are typical of those generated directly beneath the flight path by current supersonic transports such as the British-French Concorde and the Russian TU-144(Anonymous 1970, Anonymous 1973). To the side of the flight track (a tracing of the flight path upon the ground) the sonic boom intensity diminishes. The area on the ground underneath the airplane flight path which is exposed to the sonic boom noise is called the "sonic boom carpet" and extends a finite distance to the sides of the flight track. Near the edges of the carpet, the magnitude of the overpressure reaches a value near 1.0 psf which is comparable to the intensity of the simulated sonic booms. Hence, the birds appear to have been exposed to nearly the full range of sonic booms that would be generated during commercial SST flight.



DATE: AUGUST 31, 1973
NOTE: SIGNATURES PRODUCED BY BURST OF 2 INCH SHELL OVER TEST AREA

Run No.	ΔP_1 MIC #1	ΔP_1 MIC #2	ΔP_1 MIC #3	ΔP_1 MIC #4	$(\Delta P_1)_{AVE}$ ~PSF	$(\Delta P_2)_{AVE}$ ~PSF	ΔT ~SEC
1	.746	.818	.868		.811	.673	.0030
2	.617	.662	.681	.691	.663	.537	.0043
3	1.119	1.051	1.140	.791	1.025	.794	.0043
4	.783	.799	.834	.759	.794	.703	.0030
5	.746	.701	.706	.719	.718	.516	.0033
6	.821	.818	.851	.830	.825	.594	.0033
7	.746	.721	.749	.764	.743	.414	.0060
8	.448	.428	.434	.452	.441	.346	.0048
9	.858	.749	.834	.818	.815	.718	.0051
10	.821	.760	.817	.795	.798	.674	.0048
11	.783	.779	.766	.786	.779	.606	.0048
12	1.007	.974	.835	.949	.954	.708	.0010
13	.783	.701	.689	.700	.718	.622	.0053
14	.932	.935	.919	.646	.858	.752	.0048
15	1.193	1.032	1.089	.741	1.014	.805	.0030
16	.821	.701	.749	.693	.742	.567	.0053
17	.970	.896	.936	.719	.880	.555	.0013
18	.895	.818	.868	.637	.804	.721	.0043
19	.597	.545	.545	.547	.559	.633	.0038
20	.597	.565	.612	.610	.596	.442	.0030

TABLE 1. SUMMARY OF 2 INCH SHELL BURST BOOM SIMULATION RECORDINGS

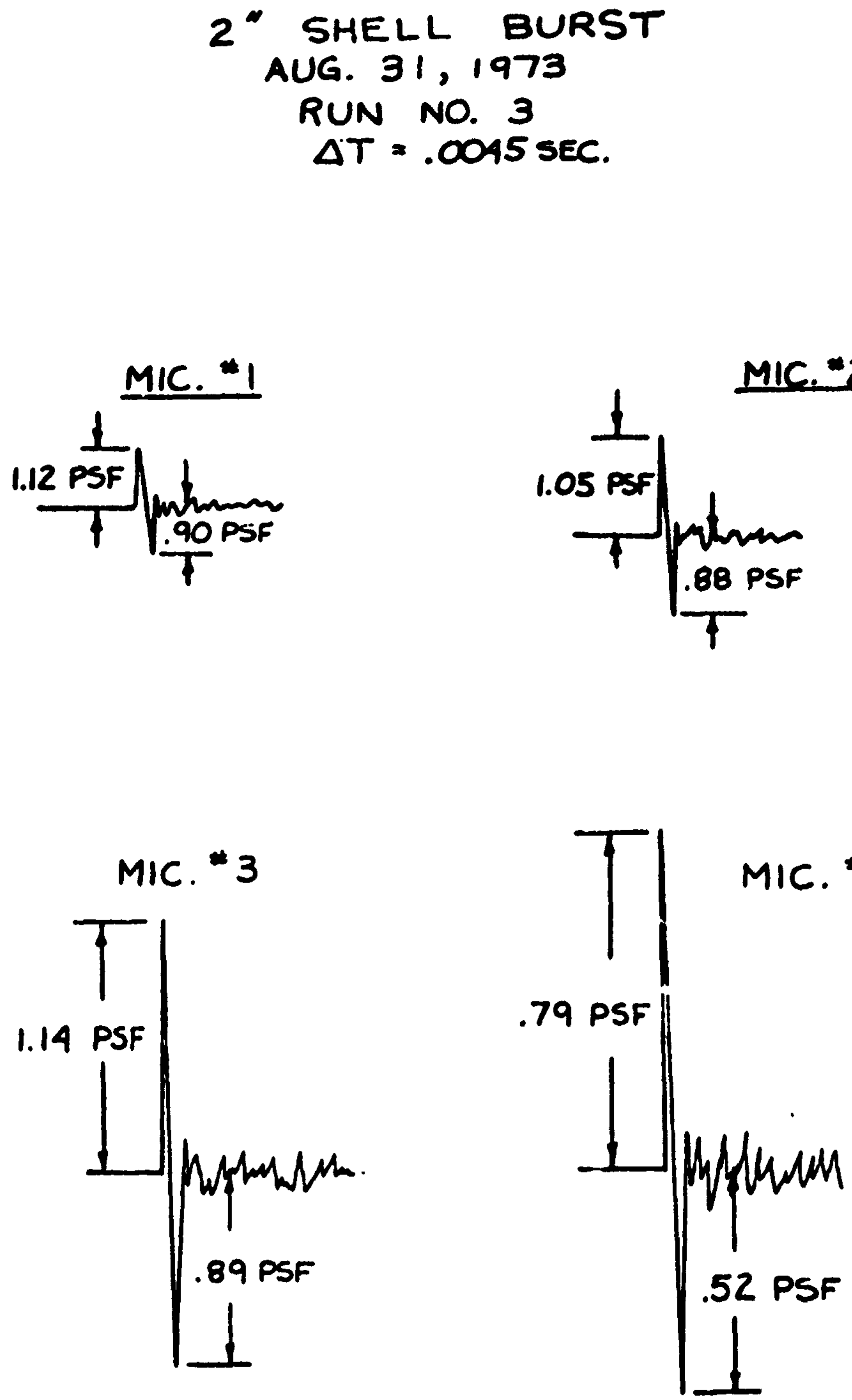


FIGURE 16. TYPICAL RECORDING OF 2 INCH SHELL BURST SONIC BOOM SIMULATION

RESULTS

HEN #187:

The nest of Hen #187, containing eight eggs, was found on May 5, 1973. Data on the administration and the effect of sonic boom on this hen is in Table 2.

The reaction of this hen at the time of a simulated sonic boom is as follows: "The hen appeared relaxed on the nest with head held low and somewhat close to her body. At the sound of the boom, the hen quickly lifted her head 2-5 inches and appeared alert for 10-20 seconds but did not move her head about. She then lowered her head and once again appeared relaxed." At no time did the hen rise up off the nest, flap her wings, call out, or do anything to disclose the location of her nest.

On May 22, 1973 two hatched eggs and one infertile egg were found in the nest. No evidence of the other five eggs could be found. These five eggs were presumably removed by predators.

No observations of the behavior of this hen at the time of a real sonic boom were possible because hatching had already occurred.

HEN #247:

The nest of Hen #247, containing eight eggs, was found on May 12, 1973. Data on the administration and effect of sonic boom on this hen is in Table 3.

This hen reacted in the same manner as Hen #187 to both real and simulated sonic booms. On June 13, 1973, eight hatched eggs were found in the nest.

HEN #192:

The nest of Hen #192, containing 12 eggs, was found on May 14, 1973. Data on the administration and effect of sonic boom on this hen is in Table 4.

Table 2. Observed effects of simulated sonic booms on nesting wild turkey hen Number 187 at Saco, Alabama, 1973

Type of Boom	Date	Time	Observed Effects
Simulated	5-12-73	09:00	None
Simulated	5-15-73	10:30	"
Simulated	5-17-73	15:00	"
Simulated	5-18-73	19:30	"
Simulated	5-19-73	12:00	"
Simulated	5-20-73	14:30	"
Simulated	5-21-73	09:50	"

Table 3. Observed effects of real and simulated sonic booms on nesting wild turkey hen Number 247 at Saco, Alabama, 1973

Type of Boom	Date	Time	Observed Effects
Simulated	5-20-73	11:30	None
Simulated	5-21-73	10:45	"
Simulated	5-22-73	11:45	"
Real	5-29-73	17:12	"
Real	5-30-73	08:23	"
Real	5-30-73	08:39	"
Real	5-30-73	16:07	"
Real	5-30-73	16:29	"
Simulated	6-09-73	16:20	"
Simulated	6-10-73	11:45	"
Simulated	6-11-73	16:10	"

This hen also reacted in the same manner as Hen #187 to both real and simulated sonic booms. On June 5, 1973, 12 hatched eggs were found in the nest.

HEN #188

The nest vicinity of Hen #188 was located on May 27, 1973. Due to the fact that three hens had abandoned their nest before being subjected to sonic booms because of activities of the investigator and due to the fact no reactions to sonic booms had been observed in Hens #187, 192 and 247, it was decided that Hen #188 would not be observed directly. Her nest was located such that any sudden movements by her could be detected visually by the investigator. Before each real or simulated sonic boom the presence of the hen on the nest was checked by telemetric triangulation. Data on the administration and effect of sonic boom on this hen is in Table 5.

On June 14, 1973, it was discovered that the nest had been destroyed by a predator. The eggs were broken open and the contents consumed and many of the hen's feathers were scattered about the nest. The investigator immediately located the hen by use of the telemetry equipment and visually determined that she had survived the attack. This hen was observed on many occasions throughout the summer.

FATE OF NESTS OF INSTRUMENTED HENS NOT SUBJECTED TO SONIC BOOMS

HEN #10

The nest of Hen #10 containing nine eggs, was found on 27-May-1973. On 5-June-1973, it was discovered that the nest had been destroyed by a predator. The eggs had been removed from the nest, were broken open, and the contents had been consumed. Contact with this hen was maintained throughout the summer and she was sighted on many occasions by the investigator.

Table 4. Observed effects of real and simulated sonic booms on nesting wild turkey hen Number 192 at Saco, Alabama, 1973

Type of Boom	Date	Time	Observed Effects
Simulated	5-20-73	12:30	None
Simulated	5-21-73	11:40	"
Simulated	5-22-73	11:00	"
Simulated	5-26-73	18:00	"
Real	5-29-73	17:12	"
Real	5-30-73	08:23	"
Real	5-30-73	08:39	"
Real	5-30-73	16:07	"
Real	5-30-73	16:29	"

Table 5. Observed effects of real and simulated sonic booms on nesting wild turkey hen Number 188 at Saco, Alabama, 1973

Type of Boom	Date	Time	Observed Effects
Real	5-29-73	17:12	None
Real	5-30-73	08:23	"
Real	5-30-73	08:39	"
Real	5-30-73	16:07	"
Real	5-30-73	16:29	"
Simulated	6-07-73	15:30	"
Simulated	6-09-73	14:30	"
Simulated	6-10-73	10:20	"
Simulated	6-10-73	14:45	"
Simulated	6-11-73	16:35	"
Simulated	6-13-73	15:50	"

HEN #2:

The nest of Hen #2 (Figure 17), containing eight eggs (Figure 18), was found on 10-May-1973. The hen became alarmed by the presence of the investigator and flew from the nest. She did not return to the nest site and did not attempt to renest.

HEN #6:

The nest of Hen #6, containing nine eggs, was found on 12-May-1973. The hen became alarmed by the presence of the investigator and flew from the nest. She did not return to the nest site and did not attempt to renest.

HEN #16:

The nest of Hen #16, containing 11 eggs, was found on 16-May-1973. This hen also became alarmed by the presence of the investigator and flew from the nest. She did not return to the nest site and did not attempt to renest. On 9-July-1973, this hen was found dead and partially consumed. The cause of death could not be determined.

Of the remaining twelve transmitter-equipped hens four did not successfully nest, one was predatorized before nesting, and seven were lost. Two of the lost hens were located by the investigator from an airplane on three different occasions but could not be located on the ground. There is strong evidence to indicate that three others that were in the same flock were killed by poachers. Not only did their transmitters cease to function on the same day but also poachers were sighted on two occasions and were heard on three other occasions within the home range of these hens. The remaining two hens were lost due to transmitter malfunction or to poaching.

Figure 17. Nest vicinity of wild turkey hen #2.

Figure 18. Nest of wild turkey hen #2, containing 8 eggs.

BROOD GROUP BOOM OBSERVATIONS

Twenty-one observations of brood groups subjected to simulated sonic booms were made. One observation was not considered to be valid because the brood group was aware of the presence of the investigator.

The reaction to simulated sonic booms in 10 (50%) of the observations was as follows: "The brood group was feeding undisturbed. At the sound of the launch blast the hens and most of the poults 'stood at attention.' Seven seconds later, at the sound of the simulated sonic boom, the hens and poults turned and ran toward the woods for a distance of 4-7 yards and then abruptly stopped. The poults began to feed again immediately while the hens 'stood at attention' and looked about. The hens remained alert for 15 to 25 seconds and then began to feed with the poults. Feeding and behavior then continued as it had before the boom."

The reaction to simulated sonic booms in 6 (30%) of the observations was as follows: "At the sound of the launch blast there was no indication of alarm by the hens or poults. At the sound of the simulated sonic boom, the hens and poults 'stood at attention' and looked about. After approximately 3-5 seconds, the poults began to feed again. The hens 'stood at attention' and remained alert for 10-20 seconds after the boom and then began to feed with the poults. Feeding and behavior then continued as it had before the boom."

In 2(10%) of the observations the following reaction occurred: "At the sound of the launch blast all of the hens and about half of the poults 'stood at attention.' The poults then began to feed again and continued to feed even at the sound of the boom. The hens remained alert for 10-20 seconds after the boom and then began to feed with the poults. Feeding and behavior then continued as it had before the boom."

In one instance (5%) at the sound of the launch blast the hens and poults 'stood at attention.' Then at the sound of the boom, one hen jumped 18 inches up into the air and then ¼ second later, the rest of the hens and poults jumped up also. At this time the brood group was feeding in a pasture and was 8-13 yards from the edge of the woods. After jumping into the air, the brood group hurried into the edge of the woods. The poults began to feed again immediately upon entering the cover of the woods. The hens remained alert for 10-15 seconds after entering the woods and then began to feed with the poults. Feeding and behavior then continued as it had before the boom.

In another instance (5%) the hens and poults also 'stood at attention' at the sound of the launch blast. At the sound of the boom, the hens began to move from the pasture toward the woods at a fast walk while the poults fed as they moved along, also at a fast walk. Upon reaching the woods the hens immediately began to feed with the poults and behavior then continued as it had before the boom.

In no instance did the hens desert any poults. None of the poults scattered and became lost from the rest of the brood group. In every observation the brood group resumed its normal activities within a maximum of 30 seconds after a simulated sonic boom.

CONCLUSIONS

The results of this study indicate that sonic boom does not initiate any abnormal behavior in wild turkeys that would result in decreased productivity.

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